

CLAIMS

1. A plasma generating electrode comprising at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, at least one of the unit electrodes each of which faces each other including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses formed in at least one surface, and a conductive film disposed inside the ceramic dielectric, the plasma generating electrode capable of generating high-density plasma in the vicinity of edges formed by a surface of the ceramic dielectric and side surfaces of the grooves and/or the recesses upon application of a voltage between the unit electrodes, the high-density plasma having a density higher than that of plasma generated between the unit electrodes in an area other than the vicinity of the edges.

2. The plasma generating electrode according to claim 1, wherein the grooves and/or the recesses are formed in an area corresponding to 20 to 80% of an area of the surface of the ceramic dielectric assuming that the surface forms a continuous plane.

3. The plasma generating electrode according to claim 1 or 2, wherein each of the grooves and/or the recesses has a thickness from the surface of the ceramic dielectric to a bottom of the groove and/or the recess of 3 to 200 μm .

4. The plasma generating electrode according to any of claims 1 to 3, wherein each of the grooves and/or the recesses has a thickness from the surface of the ceramic dielectric to a bottom of the groove and/or the recess of $1/3$ or less of an average thickness of the ceramic dielectric.

5. A plasma reactor comprising the plasma generating electrode according to any of claims 1 to 4, and a casing having a passage (gas passage) for a gas containing a specific component formed therein, wherein, when the gas is introduced into the gas passage of the casing, the specific component contained in the gas can be reacted using plasma generated by the plasma generating electrode.

6. The plasma reactor according to claim 5, further comprising a pulsed power supply for applying a voltage to the plasma generating electrode.

7. The plasma reactor according to claim 6, wherein the pulsed power supply includes at least one SI thyristor.

8. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, disposing a conductive film on one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies to obtain a conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting conductive-film-containing ceramic formed body so that the conductive film is covered to obtain a plate-shaped unit electrode precursor, forming a plurality of grooves and/or a plurality of recesses in at least one surface of the resulting unit electrode precursor to obtain a groove and/or recess-containing unit electrode precursor having a plurality of grooves and/or a plurality of recesses in at least one surface, firing the resulting groove and/or recess-containing unit electrode precursor to obtain a groove and/or recess-containing unit electrode including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses in at least

one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes each of which faces each other of the plasma generating electrode.

5 9. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, forming a plurality of grooves and/or a plurality of
10 recesses in at least one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies and disposing a conductive film on the other surface to obtain a groove and/or recess-containing conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting groove and/or recess-containing conductive-film-containing ceramic formed body so that the
15 conductive film is covered to obtain a plate-shaped unit electrode precursor, forming a plurality of grooves and/or a plurality of recesses in at least one surface of the resulting unit electrode precursor to obtain a groove and/or recess-containing unit electrode precursor having a plurality of grooves and/or a plurality of recesses in at least one surface, firing the resulting groove and/or recess-containing unit electrode precursor to
20 obtain a groove and/or recess-containing unit electrode including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses in at least one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes each of which faces each other of the plasma generating electrode.

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10. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of

generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, disposing a conductive film on one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies to obtain a
5 conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting conductive-film-containing ceramic formed body so that the conductive film is covered to obtain a plate-shaped unit electrode precursor, firing the resulting unit electrode precursor and then forming a plurality of grooves and/or a plurality of recesses in at least one surface of the resulting unit electrode precursor to
10 obtain a groove and/or recess-containing unit electrode including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses in at least one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes each of which faces each other of the plasma generating electrode.

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11. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, disposing a conductive film having a plurality of
20 openings formed therethrough in its thickness direction on one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies to obtain a conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting conductive-film-containing ceramic formed body so that
25 the conductive film is covered to obtain a plate-shaped unit electrode precursor, firing the resulting unit electrode precursor to obtain a groove and/or recess-containing unit electrode including a plate-shaped ceramic dielectric having a plurality of grooves

and/or a plurality of recesses corresponding to a shape of the openings in the conductive film disposed on the unfired ceramic formed body in at least one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes

5 each of which faces each other of the plasma generating electrode.